No. 686,628. Patented Nov. 12, 1901.

E. Y. MOORE.

CRANK.

(Application filed Oct. 29, 1900.)

(No Model.)

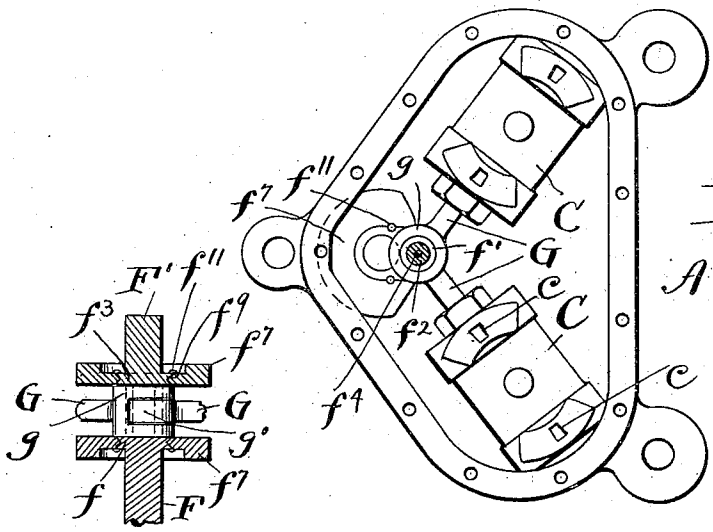


Fig. 1,

Fig. 4,

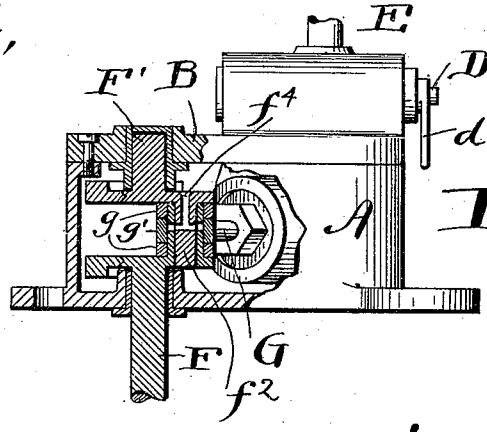


Fig. 2,

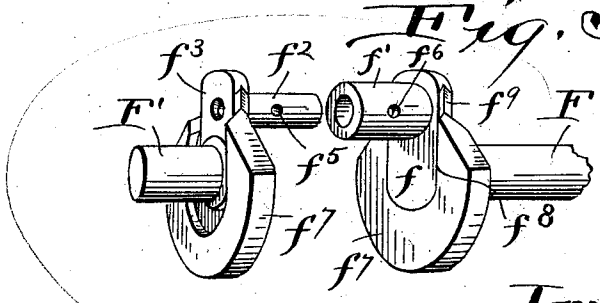


Fig. 3,

Witnesses.
E. B. Gilchrist
F. D. Ammen

Inventor,
Edward Y. Moore,
By his Attorneys,
Thurston & Bates.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

EDWARD Y. MOORE, OF CLEVELAND, OHIO, ASSIGNOR TO THE CHISHOLM AND MOORE MANUFACTURING COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

CRANK.

SPECIFICATION forming part of Letters Patent No. 686,628, dated November 12, 1901.

Application filed October 29, 1900. Serial No. 34,784. (No model.)

To all whom it may concern:

Be it known that I, EDWARD Y. MOORE, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Cranks, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of this invention is to provide a very simple and efficient double crank made separable, so that it may be used in conjunction with piston-rods or connecting-rods whose ends are rigid—that is, have their straps non-removable. The invention is adapted for a variety of uses, an illustration of which may be an engine having cylinders inclosed within a casing and having trunk-pistons whose rods take directly onto the crank-pin, for in such constructions it is especially desirable to employ a double crank, so that proper bearing-surface may be obtained and the requisite stiffness given to the crank without an undue size of crank, and it is likewise desirable that the separable strap at the head of the rod be dispensed with to save space and overcome the possibility of the strap (which is hidden from view) working loose.

The invention consists, broadly, of the double crank I have devised for this purpose—namely, a pair of single cranks journaled axially and one having a tubular crank-pin, into which the crank-pin of the other crank extends.

The invention includes the combination of such a crank with a reciprocating rod having a rigid end with an opening through it, which is journaled on said tubular crank-pin.

Other features of the invention will be hereinafter pointed out, and it may be generally summarized as consisting of the combinations of parts hereinafter described, and definitely stated in the claims.

The drawings clearly illustrate my invention, showing it particularly as adapted for use with a pair of oscillating cylinders contained within a casing governed by a suitable valve and both taking onto the same crank-pin.

Figure 1 is a plan of such engine with the cover-plate containing the governing-valve removed. This view is sectioned through the inner crank-pin. Fig. 2 is a side elevation of the engine, partly broken away and sectioned through the shaft. Fig. 3 is a perspective view of the two parts of the double crank. Fig. 4 is a section through the center of the shaft looking toward the crank-pin.

The casing consists of a box A and a cover-plate B therefor. Within this casing are shown a pair of oscillating cylinders C, having ports *c*. These ports are supplied with operating fluid by any suitable passage-way, which may come through the body of the plate B. On the outer side of this plate is a suitable governing-valve D. The interior of the valve is not shown, as it is immaterial to the present invention; but it may be considered as a rotatable valve operated by a handle *d* and controlling the supply from the main pipe E to the cylinder-valves.

The main shaft F is journaled in a bushing within the base of the casing A. Secured to its inner side is the crank *f*, and on this crank is the crank-pin *f'*, which is recessed longitudinally or tubular. Into the opening in this crank-pin takes the smaller crank-pin f^2, carried by the crank f^3, which is secured to the shaft F', which is journaled in alinement with the shaft F in a bushing in the cover. In the drawings it is shown as terminated in that bushing, though this may be as desired. A double crank is thus provided which is separable by the removal of the cover-plate B.

Within the cylinders are suitable pistons, which have rods G, with rigid ends, through which are cylindrical openings, by which they surround the crank-pin *f'*. By having the double crank separable the heads of these rods may be made rigid, and no additional strap is required. The inner crank-pin preferably extends substantially through the tubular one, thus making the composite pin very stiff, preventing the force of the rods from giving a cross-bending strain to the cranks.

To provide for the oiling of the crank-pin, I make an opening f^4 longitudinally of the pin f^2, terminating in a lateral opening f^5 through

said pin, which lateral opening alines with openings f^6 through the tubular pin f'. Oil may thus be conveyed through the crank-pin directly to the surrounding rods as easily as if an integral crank were used.

In the form shown in the drawings, where two piston-rods are taking onto the one crank-pin, I make one of the heads g bifurcated and adapted to take between its forks the other head g', as clearly shown in Figs. 2 and 4. Thus each rod is journaled axially at its head.

I find it very convenient to make the single crank, the shaft, and the crank-pin of a single forging from a material of diameter determined by the size of the shaft. It is impracticable, or at least very inconvenient, to do this if the crank is made in a disk form or with an integral counterbalance. Therefore to suitably counterbalance the cranks as I make them I secure thereto on the side opposite the crank-pin the separate U-shaped counterweights f^7. These counterweights are preferably made as shown in the drawings, being a portion of a circle on their outer periphery, but cut away diagonally, as shown, to present an elongated inner U-shaped opening f^8. The edge of this U-shaped opening is brought to a point or V shape transversely, as appears from Figs. 3 and 4, whereby the two edges of the U-shaped opening may have virtually a tongue-and-groove connection with the crank, occupying corresponding V-shaped recesses in the edges of the crank. After the counterweights are in place they are locked by pins f'', set into the counterweight and crank at the junction-line. This counterweight is more advantageous than a disk crank, as the weight can be more conveniently concentrated opposite the crank-pin, and it may be a very cheap casting, whereas the shaft, crank, and crank-pin are of high-grade steel.

Having described my invention, I claim—

1. In a separable double crank, in combination, a pair of shafts journaled axially in bearings relatively rigid to each other, a pair of crank-arms secured to the ends of said shafts, a crank-pin carried by each arm, one of said pins being tubular and having an exterior cylindrical surface extending from its extreme end and the other pin projecting into the tubular pin at least as far as the opposite crank-arm, substantially as described.

2. A separable double crank including a pair of shafts journaled axially in bearings rigid with relation to each other, a pair of crank-arms secured to the inner ends of said shafts, and a pair of coöperating pins rigid with the inner faces of said arms one of said pins being tubular and having a cylindrical exterior surface to its extreme free end and the other pin extending into said tubular pin and across the opposite crank-arm the end of the tubular pin abutting against the crank-arm which carries the interior pin, combined with one or more rigid headed rods surrounding the tubular pin and abutting said crank-arms, substantially as described.

3. A crank, a crank-pin, and shaft made of an integral piece of metal, combined with a counterweight made of a separate piece of metal in a general U shape yoking onto opposite sides of the crank and rigidly secured thereto, substantially as described.

4. The combination with a crank-arm having substantially parallel sides of a counterweight formed in a general U shape and adapted to engage said sides, said sides of the crank and the inner wall of the counterweight being formed with interlocking tongues and grooves, substantially as described.

5. The combination with a crank having substantially parallel sides, of a counterweight formed in a general U shape and adapted to engage said sides, said sides of the crank and the inner wall of the counterweight being formed with interlocking tongues and grooves, and pins at the junction of said interlocking edges engaging the two and preventing separation, substantially as described.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

EDWARD Y. MOORE.

Witnesses:
ALBERT H. BATES,
H. M. WISE.